CLAIM AMENDMENTS

Claims 1-69 remain in the application. Claims 1, 9-13, 15-17, 21, 25-26, 34, 46, 54, 55, 57 and 64 have been amended. Claim 62 has been canceled. No claims have been added.

Listing of the Claims:

1. (Currently Amended) An apparatus comprising:

a network element to be coupled to a first and second span of a plurality of spans that interconnect a set of network elements to form a ring network, each of said plurality of spans having two sub-spans on which traffic travels in opposite directions on a plurality of channels that circumvent said ring, each said plurality of channels including working channels and protecting channels, said network element including,

a traffic handler to reprogram, responsive to protection switches and un-switches, the connection configuration on the protecting channels of the sub-spans of the first and second spans that provide traffic to the network element, wherein a given connection configuration is to identify one or more concatenations of two or more components within the protecting channels, where a given concatenation of components is to collectively carry data for a single circuit at a greater bandwidth than that of data carried by a single component.

2. (Original) The apparatus of claim 1, wherein, responsive to a protection switch, two different connection configurations are programmed on the protecting channels of the sub-spans of the first and second spans that provide traffic to the network element.

3. (Original) The apparatus of claim 1, wherein, responsive to a protection switch, the same connection configuration is programmed on the protecting channels of the sub-spans of the first and second spans that provide traffic to the network element.

4. (Original) The apparatus of claim 1, wherein, responsive to a protection un-switch, two different connection configurations are programmed on the protecting channels of the sub-spans of the first and second spans that provide traffic to the network element.

5. (Original) The apparatus of claim 1, wherein, responsive to a protection un-switch, the same connection configuration is programmed on the protecting channels of the sub-spans of the first and second spans that provide traffic to the network element.

6. (Original) The apparatus of claim 1, wherein said traffic handler includes a connection table generator to communication connection configuration information with others of said plurality of network elements.

7. (Original) The apparatus of claim 1, wherein said ring network is a modified bi-direction line switched ring.

8. (Original) The apparatus of claim 1, wherein said network element further includes:

a first set of structures to store the connection configurations programmed on the working and protecting channels of the sub-spans of the first and second spans that provide traffic to the network element; and

a second set of structures to store the connection configurations programmed on the working channels of those of said plurality of spans not directly connected to the network element.

9. (Currently amended) An apparatus comprising:

a network element coupled to a first and second span of a plurality of spans that interconnect a set of network elements to form a ring network, each of said plurality of spans having two sub-spans on which traffic travels in opposite directions on a plurality of channels that circumvent said ring, each said plurality of channels including working channels and protecting channels, said network element including a machine readable medium having stored thereon instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations including,

storing in a first set of structures ~~connection~~ concatenation configurations for the working and protecting channels programmed on the receiving side of the ports coupled to the sub-spans of the first and second spans; and

storing in a second set of structures the ~~connection~~ concatenation configurations programmed on the working channels of those of said plurality of spans not directly connected to said node.

10. (Currently Amended) The apparatus of claim 9, wherein said storing in said first set of structures includes storing one ~~connection~~ concatenation configuration for both of the working and protecting channels on the receiving side of both of the ports coupled to of the sub-spans of the first and second spans.

11. (Currently Amended) The apparatus of claim 9, wherein said storing in said first set of structures includes storing one ~~connection~~ concatenation configuration for each of the working and protecting channels on the receiving side of both of the ports coupled to of the sub-spans of the first and second spans.

12. (Currently Amended) The apparatus of claim 9, wherein said storing in said first set of structures includes storing one ~~connection~~ concatenation configuration for both of the working and protecting channels on the receiving side of each of the ports coupled to of the sub-spans of the first and second spans.

13. (Currently Amended) The apparatus of claim 9, wherein said storing in said first set of structures includes storing one ~~connection~~ concatenation configuration for each of the working and protecting channels on the receiving side of each of the ports coupled to of the sub-spans of the first and second spans.

14. (Original) The apparatus of claim 9, wherein said ring network is a modified bi-direction line switched ring.

15. (Currently Amended) The apparatus of claim 9, wherein said machine readable medium further includes:

a traffic handler, to be coupled to said first and second set of structures, to reprogram, responsive to protection switches and un-switches, the ~~connection~~ concatenation configurations for the protecting channels programmed on the receiving side of the ports coupled to of the sub-spans of the first and second spans.

16. (Currently Amended) The apparatus of claim 9, wherein said machine readable medium further includes:

a traffic handler, to be coupled to said first set of structures, to reprogram, responsive to protection un-switches, the ~~connection~~ concatenation configurations for the protecting channels on the receiving side of the ports coupled to of the sub-spans of the first and second spans; and

said traffic, to be coupled to said second set of structures, to reprogram, responsive to protection switches, the ~~connection~~ concatenation configurations for the protecting channels on the receiving side of the ports coupled to of the sub-spans of the first and second spans.

17. (Currently Amended) An apparatus comprising:

a network element to be coupled to a first and second span of a BLSR ring, said network element including,

means for providing different connection configurations on the protecting channels of said first and second spans responsive to protection switches and un-switches, wherein said different connection configurations capable to identify different concatenations each to carry data for a single circuit with a bandwidth greater than that of data carried by a single component of the protecting channels.

18. (Original) The apparatus of claim 17, where said means allows a first of said plurality of channels to be part of two different sized connections programmed on said first and second spans.

19. (Original) The apparatus of claim 17, where said means allows said first spans to have programmed thereon a concatenation of a plurality of the BLSR channels that is not programmed on said second span.

20. (Original) The apparatus of claim 17, wherein said means includes:

a storage means for storing said different connection configurations; and

a hardware control means for programming ports of said network element coupled to said first and second spans.

21. (Currently Amended) An apparatus comprising:

a plurality of network elements;

a plurality of spans interconnecting said plurality of network elements to form a ring, each of said plurality of spans having two sub-spans on which traffic travels in opposite directions;

a multiplexing ring transport network protocol operating on said ring providing a plurality of channels on each of said sub-spans, each of said plurality of channels includes a set of working channels and a mutually exclusive set of protecting channels, wherein a first connection configuration programmed on a first of said sets of channels is not the same as a second connection configuration programmed on a second of said sets of channels <u>because they identify one or more different concatenations of two or more components of said sets of channels, where each of the concatenations of components carries data for a single circuit with a bandwidth greater than that of data carried by a single component.</u>

22. (Original) The apparatus of claim 21, wherein said first set of channels and said second set of channels are respectively the set of working channels and the set of protecting channels on a same one of said sub-spans.

23. (Original) The apparatus of claim 22, wherein the same connection configuration must be programmed on each of said sets of working channels.

24. (Original) The apparatus of claim 22, wherein the same connection configuration must be programmed on each of said sets of working channels on which traffic travels in the same direction as said first set of channels, and wherein a third connection configuration is programmed on each of said sets of working channels on which traffic travels in the opposite direction as first set of channels, and wherein said first and third connection configurations differ.

25. (Currently Amended) The apparatus of claim 22, wherein the same connection configurations must be programmed on the set of working channels of both sub-spans of any given one of said spans, and wherein the connection configurations programmed on the sets of working channels of two different ones of said spans ~~differ~~ are not same.

26. (Currently Amended) The apparatus of claim 22, wherein the connection configurations programmed on the sets of working channels of two different ones of said spans differ, and wherein the connection configurations programmed on the set of working channels of each of the sub-spans of at least one of said ~~differ~~ are not same.

27. (Original) The apparatus of claim 21, wherein said first set of channels and said second set of channels are the sets of working channels on two different ones of said sub-spans.

28. (Original) The apparatus of claim 27, wherein said two different ones of said sub-spans are part of a same one of said spans.

29. (Original) The apparatus of claim 27, wherein said two different ones of said sub-spans are part of two different ones of said spans.

30. (Original) The apparatus of claim 27, wherein the same connection configuration must be programmed on each of said sets of working channels on which traffic travels in the same direction as said first set of channels.

31. (Original) The apparatus of claim 27, wherein the same connection configuration must be programmed on the set of working channels of both sub-spans of any given one of said spans.

32. (Original) The apparatus of claim 27, wherein said two different ones of said sub-spans are part of a same one of said spans, and wherein a third connection configuration is programmed on the set of working channels of a sup-span of a different one of said spans, and wherein said third connection configuration is not the same as said first connection configuration.

33. (Original) The apparatus of claim 21, wherein said multiplexing ring transport protocol is a bi-directional line switched ring protocol.

34. (Currently Amended) An apparatus comprising:

a plurality of network elements;

a plurality of spans interconnecting said plurality of network elements to form a ring, each of said plurality of spans including two sub-spans, said sub-spans forming two sub-rings, wherein a plurality of channels circumvent said ring on each of said sub-rings, each of said plurality of channels including working channels and protecting channels; and

a traffic handler on each of said plurality of network elements that together reprogram the connection configurations of the protecting channels on at least certain of said sub-spans responsive to protection switches and un-switches, wherein the connection configurations identify different concatenations of two or more components of the protecting channels, where each of the concatenations of components carries data for a single circuit.

35. (Original) The apparatus of claim 34, wherein said traffic handlers provide for different connection configurations on a per sub-span basis without mirroring.

36. (Original) The apparatus of claim 34, wherein said traffic handlers provide for different connection configurations on a per sub-span basis with mirroring.

37. (Original) The apparatus of claim 34, wherein said traffic handlers provide for different connection configurations on a per span basis with mirroring.

38. (Original) The apparatus of claim 34, wherein said traffic handlers provide for different connection configurations on a per span basis without mirroring.

39. (Original) The apparatus of claim 34, wherein said traffic handlers provide for different connection configurations on a per sub-ring basis with mirroring.

40. (Original) The apparatus of claim 34, wherein said traffic handlers provide for different connection configurations on a per sub-ring basis without mirroring.

41. (Original) The apparatus of claim 34, wherein the same connection configuration must be provided on the working channels of every sub-span, but said traffic handlers provide for a different connection configuration on the protecting channels.

42. (Original) The apparatus of claim 34, wherein each of said plurality of network elements includes:

a first set of structures having stored therein the connection configurations programmed on the working and protecting channels of the sub-spans that provide traffic to the network element; and

a second set of structures having stored therein the connection configurations programmed on the working channels of those of said plurality of spans not directly connected to the network element.

43. (Original) The apparatus of claim 34, wherein said ring is operated as a bi-directional line switched ring.

44. (Original) The apparatus of claim 34, wherein each of said network elements participates as a node of said ring, each node having stored therein the connection configuration programmed on the working channels of at least every one of said plurality of spans not directly connected to that node.

45. (Original) The apparatus of claim 34, wherein each of said traffic handlers includes a connection table generator to communication connection configuration information.

46. (Currently Amended) A method comprising:

responsive to a failure in a span in a ring network, indicating a protection switch to occur on said ring network, wherein said ring network operates on a plurality of network elements that participate as nodes of said ring network and that are connected by spans to form a ring, each of said plurality of spans including two sub-spans on which traffic travels in opposite directions on a plurality of channels, each of said sub-spans coupled to a receiving side and a transmitting side of ports on two different ones of said nodes, said plurality of channels in each direction including a set of working channels and a set of protecting channels; and

responsive to said protection switch, programming the receiving side of those of said ports that are coupled to operable sub-spans so that their protection channels have programmed thereon the connection configuration of the working channels programmed on the opposite direction sub-spans of said failed span, wherein the connection configuration identifies a combination of a single component and a concatenation of two or more components or a combination of multiple concatenations of two or more components, where each concatenation carries data for a different single circuit.

47. (Original) The method of claim 46, where said programming includes:

each of said node, selecting from a storage of the connection configurations of the working channels of each of said spans the connection configuration of the working channels programmed on said failed span.

48. (Previously presented) The method of claim 46, further comprising:

storing, prior to said indicating, in each of said plurality of network elements information identifying the connection configurations of the working channels of each of the spans not directly connected to that network element.

49. (Original) The method of claim 48, further comprising:

communicating, prior to said storing, between said plurality of network elements said information.

50. (Original) The method of claim 46, further comprising:

responsive to a correction of said failure, indicating a protection un-switch; and

responsive to said protection un-switch, reprogramming the receiving side of those of said ports that were programmed responsive to said protection switch to return them to their state prior to the protection switch.

51. (Original) The method of claim 50, wherein the state prior to the protection switch includes a connection configuration programmed on the protecting channels of a first of said spans that does not mirror a connection configuration programmed on the working channels of said first span.

52. (Original) The method of claim 46, wherein said ring network is a BLSR ring.

53. (Original) The method of claim 46, wherein the same connection configuration must be programmed on each of said sets of working channels.

54. (Currently Amended) The method of claim 46, wherein the same connection configurations must be programmed on the set of working channels of both sub-spans of any given one of said spans, and wherein the connection configurations programmed on the sets of working channels of two different ones of said spans ~~differ~~ are not same.

55. (Currently Amended) The method of claim 46, wherein the connection configurations programmed on the sets of working channels of two different ones of said spans differ, and wherein the connection configurations programmed on the set of working channels of each of the sub-spans of at least one of said spans ~~differ~~ are not same.

56. (Original) The method of claim 46, wherein the same connection configuration must be programmed on the set of working channels of both sub-spans of any given one of said spans.

57. (Currently Amended) A machine-readable medium providing instructions that, when executed by a set of one or more processors, cause said set of processor to perform operations comprising:

receiving, at a node of a ring network, a first message indicating a protection switch, wherein said ring network operates on a plurality of network elements that participate as nodes of said ring network and that are connected by a plurality of spans to form a ring, each span including two sub-spans on which traffic travels in opposite directions on a plurality of channels, said plurality of channels in each direction including a set of working channels and a set of protecting channels; and

responsive to said first message, reprogramming a receiving side of a first port of said node coupled to one of said sub-spans so that its

protecting channels have programmed thereon the connection configuration of the working channels programmed on the opposite direction sub-span of a span identified by said first message, wherein said reprogramming also includes reprogramming a receiving side of a second port of said node coupled to the other direction sub-span of the ring relative to said first port, so that the protecting channels on that sub-span have programmed thereon the connection configuration of the working channels programmed on the opposite direction sub-span of the span identified by said first message.

58. (Original) The machine-readable medium of claim 57, wherein said operations further comprise:

selecting from a storage of the connection configurations of the working channels of each of said plurality of spans the connection configuration used for said reprogramming.

59. (Original) The machine-readable medium of claim 57, wherein said operations further comprise:

storing, prior to said receiving, the connection configurations of the working channels of each of the spans not directly connected to said node.

60. (Original) The machine-readable medium of claim 59, wherein said operations further comprise:

receiving, prior to said storing, from said plurality of network elements said connection configurations.

61. (Original) The machine-readable medium of claim 57, wherein said operations further comprise:

receiving, at said node, a second message indicating a protection un-switch; and

responsive to said second message, reprogramming said receiving side of said first port to its state prior to the protection switch.

62. (Canceled)

63. (Original) The method of claim 57, wherein said ring network is a BLSR ring.

64. (Currently Amended) A machine-readable medium providing instructions that, when executed by a set of one or more processors, cause said set of processor to perform operations comprising:

in a node of a ring network, storing a connection configuration programmed on working channels on each span of said ring network not directly connected to said node, wherein said ring network operates on a plurality of network elements that participate as nodes of said ring network and that are connected by spans to form a ring, each span including two sub-spans on which traffic travels in opposite directions on a plurality of channels, said plurality of channels in each direction including working channels and protecting channels; and

responsive to a protection switch, reprogramming those ports of the node coupled to the sub-spans delivering traffic to that node so that their protecting channels have programmed thereon the connection configuration of the working channels programmed on the opposite direction sub-spans of a span that failed, wherein the connection configuration identifies a combination of a single component and a concatenation of two or more

components or a combination of multiple concatenations of two or more components, where each concatenation carries data for a different single circuit.

65. (Original) The machine-readable medium of claim 64, wherein said operations further comprise:

receiving, prior to said storing, from said plurality of network elements said connection configurations.

66. (Original) The machine-readable medium of claim 64, wherein said operations further comprise:

responsive to a protection un-switch, reprogramming those ports of the node coupled to the sub-spans delivering traffic to that node so that their protecting channels have programmed thereon their state prior to the protection switch.

67. (Original) The machine-readable medium of claim 66, wherein said reprogramming responsive to said protection un-switch includes reprogramming the protecting channels on a receiving side of two ports of the node with different connection configurations.

68. (Original) The machine-readable medium of claim 64, wherein said reprogramming includes reprogramming the protecting channels on a receiving side of two ports of the node with different connection configurations.

69. (Original) The method of claim 64, wherein said ring network is a BLSR ring.